

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Rangachary Mukundan et al.      Docket No.: S-102,315  
Serial No.:      Examiner:  
Filed : November 25, 2003      Art Unit:  
For : MIXED POTENTIAL HYDROCARBON SENSOR WITH LOW  
SENSITIVITY TO MEETHANE AND CO

Commissioner for Patents  
PO Box 1450  
Alexandria, VA 22313-1450

**INFORMATION DISCLOSURE STATEMENT**  
**UNDER 37 CFR 1.56, 1.97, AND 1.98**

Sir:

The documents listed below, copies attached, are submitted in compliance with the duty of disclosure defined in 37 CFR 1.56.

1. Pham et al., "Hydrocarbon Sensors and Materials Therefore," US Patent 6,103,080, Issued August 15, 2000.

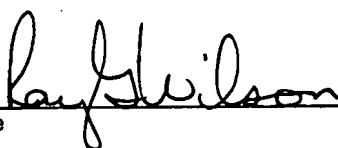
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**CERTIFICATE OF MAILING/TRANSMISSION (37 CFR 1.8(a))**

I hereby certify that this correspondence is, on the date shown below, being:

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\_\_\_\_\_  
Signature

Date November 25, 2003

Ray G. Wilson  
(type or print name of person certifying)

2. Kurosawa et al., "NO<sub>x</sub> Sensor," US Patent 6,019,981, Issued February 1, 2000.
3. Garzon et al., "Solid State Oxygen Sensor," US Patent 5,543,025, Issued August 6, 1996.
4. Kusanagi et al., "Electrochemical Gas Sensor," US Patent 5,215,643, Issued June 1, 1993.
5. Mehrotra et al., "Whisker Reinforced Ceramic and a Method of Clad/Hot Isostatic Pressing Same," US Patent 4,820,663, Issued April 11, 1989.
6. Mase et al., "Method of Producing Ceramics," US Patent 4,735,666, Issued April 5, 1988.
7. Holfelder et al., "Electrochemical Oxygen Sensor, Particularly for Analysis of Combustion Cases from Internal Combustion Engines," US Patent 4,502,939, Issued March 5, 1985.
8. Hsu et al., "Solid Electrolyte Structure and Method for Forming," US Patent 4,614,628, Issued September 30, 1986.
9. Rychlewski, "Depression Cathode Structure for Cathode Ray Tubes Having Surface Smoothness and Method for Producing Same," US Patent 4,478,590, Issued October 23, 1984.
10. Smith, "Method of Making Metalized Ceramic Bodies," US Patent 3,074,143, Issued January 22, 1963.
11. Chiba et al. "Device for Detection of Air/Fuel Ratio From Oxygen Partial Pressure in Exhaust Gas," US Patent 4,304,652, Issued December 8, 1981.
- 12. Muller et al., "Electrochemical Oxygen Sensor, Particularly for Use in the Exhaust System of Automotive-Type Internal Combustion Engines," US Patent 4,277,323, Issued July 7, 1981.
13. Kennedy, "Solid Electrolyte Electrolytic Cell," US Patent 3,723,589, Issued March 27, 1973.

/SV/  
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06/20/2007

14. Niwa et al., "Oxygen Concentration Sensing Apparatus," US Patent 4,220,517, Issued September 02, 1980.
15. Worrell et al., "Electro-Chemical Sensors and Methods for their Manufacture and Use," US Patent 4,786,374, Issued November 22, 1988.
16. Williams et al., "Solid Electrolyte Mixed Potential Phenomena," Studies in Inorganic Chemistry, Vol. 3, pp 275-278, 1982.
17. Miura et al., "Highly Selective CO Sensor Using Stabilized Zirconia and a Couple of Oxide Electrodes," Sensors and Actuators B 47 pp. 84-91, 1998.
18. Li et al., "High-Temperature Carbon Monoxide Potentiometric Sensor," J. Electrochem. Soc. Vol. 140, No. 4, pp. 1068-1073, April 1993.
19. Miura et al., "Mixed Potential Type NO<sub>x</sub> Sensor Based on Stabilized Zirconia and Oxide Electrode," J. Electrochem. Soc. Vol. 143, No. 2, February 1996.
20. Hibino et al., "High-Temperature Hydrocarbon Sensors Based on a Stabilized Zirconia Electrolyte and Metal Oxide Electrodes," Electrochemical and Solid State Letters, 2 (12), pp. 651-653, 1999.
21. Mukundan et al., "A Mixed-Potential Sensor Based on a Ce<sub>0.8</sub>Gd<sub>0.2</sub>O<sub>1.9</sub> Electrolyte and Platinum and Gold Electrodes," Journal of The Electrochemical Society, 147 (4), pp. 1583-1588, 2000.
22. Mukundan et al., "Ceria-Electrolyte-Based Mixed Potential Sensors for the Detection of Hydrocarbons and Carbon Monoxide," Electrochemical and Solid State Letters, 2 (8), pp. 412-414, 1999.

This Information Disclosure Statement is not to be construed as a representation that a search has been made or that additional matter material to the examination of this application does not exist.

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It is requested that the above citations be made of record in the prosecution of this application. Applicant does not believe that any of these citations constitutes prior art under 35 U.S.C. 102.

Respectfully submitted,

Date: November 25, 2003

  
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Signature of Attorney

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Form PTO-1449 U.S. Department of Commerce (Modified) Patent and Trademark Office  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>  37 CFR 1.98(b)	Attorney Docket No.	Serial No.
	S-102,315	
	Applicant(s)	
	Rangachary Mukundan	
	Filing Date 11/25/03	Group

**U.S. PATENTS DOCUMENTS**

EXAMINER INITIAL	PATENT NUMBER	ISSUE DATE	PATENTEE	CLASS	SUB CLASS	FILING DATE
/SV/	6 1 0 3 0 8 0	08/15/00	Pham et al.	204	424	02/11/98
/SV/	6 0 1 9 8 8 1	02/01/00	Kurosawa et al.	204	424	09/25/98
/SV/	5 5 4 3 0 2 5	08/06/96	Garzon et al.	204	425	01/30/95
/SV/	5 2 1 5 6 4 3	06/01/93	Kusanagi et al.	204	412	02/23/89
/SV/	4 8 2 0 6 6 3	04/11/89	Mehrotra et al.	501	87	09/02/87
/SV/	4 7 3 5 6 6 6	04/05/88	Mase et al.	156	89	01/21/86
/SV/	4 5 0 2 9 3 9	03/05/85	Holfelder et al.	204	429	01/19/84
/SV/	4 6 1 4 6 2 8	09/30/86	Hsu et al.	264	61	07/16/84

**FOREIGN PATENT DOCUMENTS**

EXAMINER INITIAL	PATENT NUMBER	ISSUE DATE	COUNTRY	CLASS	SUB CLASS	Translation YES NO
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**OTHER DOCUMENTS** (Including Author, Title, Date, Place of Publication)

/SV/	Williams et al., "Solid Electrolyte Mixed Potential Phenomena," Studies in Inorganic Chemistry, Vol. 3, pp 275-278, 1982.
/SV/	Miura et al., "Highly Selective CO Sensor Using Stabilized Zirconia and a Couple of Oxide Electrodes," Sensors and Actuators B 47 pp. 84-91, 1998.
/SV/	Li et al., "High-Temperature Carbon Monoxide Potentiometric Sensor," J. Electrochem. Soc. Vol. 140, No. 4, pp. 1068-1073, April 1993.

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\*EXAMINER: Initial citation considered. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

Form PTO-1449 (Modified)	U.S. Department of Commerce Patent and Trademark Office	Attorney Docket No.  S-102,315	Serial No.
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>		Applicant(s)  Rangachary Mukundan et al.	
		Filing Date 11/25/03	Group

37 CFR 1.98(b)

### U.S. PATENTS DOCUMENTS

EXAMINER INITIAL	PATENT NUMBER								ISSUE DATE	PATENTEE	CLASS	SUB CLASS	FILING DATE
/SV/		4	4	7	8	5	9	0	10/23/84	Rychlewski	445	50	12/28/81
/SV/		3	0	7	4	1	4	3	01/22/63	Smith	25	156	02/01/60
/SV/		4	3	0	4	6	5	2	12/08/81	Chiba et al.	204	195 S	06/06/80
/SV/		4	2	7	7	3	2	3	07/07/81	Muller et al.	204	195 S	02/14/80
/SV/		3	7	2	3	5	8	9	03/27/73	Kennedy	264	101	02/25/71
		<del>6</del>	<del>1</del>	<del>0</del>	<del>3</del>	<del>0</del>	<del>8</del>	<del>0</del>	<del>08/15/00</del>	<del>Pham et al.</del>	<del>204</del>	<del>424</del>	<del>02/11/98</del>
/SV/		4	7	8	6	3	7	4	11/22/88	Worrell et al.	204	1	09/29/87

### OTHER DOCUMENTS (Including Author, Title, Date, Place of Publication)

/SV/	Miura et al., "Mixed Potential Type NO <sub>x</sub> Sensor Based on Stabilized Zirconia and Oxide Electrode," J. Electrochem. Soc. Vol. 143, No. 2, February 1996.
/SV/	Hibino et al., "High-Temperature Hydrocarbon Sensors Based on a Stabilized Zirconia Electrolyte and Metal Oxide Electrodes," Electrochemical and Solid State Letters, 2 (12), pp. 651-653, 1999.
/SV/	Mukundan et al., "A Mixed-Potential Sensor Based on a Ce <sub>0.8</sub> Gd <sub>0.2</sub> O <sub>1.9</sub> Electrolyte and Platinum and Gold Electrodes," Journal of The Electrochemical Society, 147 (4), pp. 1583-1588, 2000.
/SV/	Mukundan et al., "Ceria-Electrolyte-Based Mixed Potential Sensors for the Detection of Hydrocarbons and Carbon Monoxide," Electrochemical and Solid State Letters, 2 (8), pp. 412-414, 1999.

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